Listing of the Claims:

1. (Original) A method of improving the operation of an existing ethylene oxide manufacturing process, said method comprises:

charging a first reactor feed, having a first carbon dioxide concentration, to an epoxidation reactor system comprising an epoxidation reactor containing a first volume of high activity epoxidation catalyst;

yielding from said epoxidation reactor system a first epoxidation reactor effluent;

charging at least a portion of said first epoxidation reactor effluent to an ethylene oxide absorber used for separating said first epoxidation reactor effluent into a first recycle stream, having a second carbon dioxide concentration, and a first ethylene oxide stream;

dividing said first recycle stream into a first split portion and a first remaining portion;

providing a carbon dioxide removal system which includes a carbon dioxide absorber and a solvent regenerator, wherein said carbon dioxide absorber provides for receiving a carbon dioxide-containing feed gas and for contacting said carbon dioxide-containing feed gas with a lean solvent to yield a rich solvent and a carbon dioxide depleted gas stream, and wherein said solvent regenerator provides for receiving said rich solvent and separating carbon dioxide there from and yielding said lean solvent and a carbon dioxide gas stream;

charging at least a portion of said first remaining portion to said carbon dioxide removal system as said carbon dioxide-containing feed gas to yield as said carbon dioxide depleted gas stream a second recycle stream, having a third carbon dioxide concentration, and to yield as said carbon dioxide gas stream a first carbon dioxide vent stream;

combining at least a portion of said first split portion and at least a portion of said second recycle stream with oxygen and ethylene to thereby form said first reactor feed;

removing from said epoxidation reactor at least a portion of said first volume of high activity epoxidation catalyst and replacing therewith a replacement charge of a second volume of a high selectivity epoxidation catalyst to provide a modified epoxidation reactor system;

charging a second reactor feed, having a fourth carbon dioxide concentration which is lower than said first carbon dioxide concentration, to said modified epoxidation reactor system having said replacement charge;

yielding from said modified epoxidation reactor system a second epoxidation reactor effluent;

charging at least a portion of said second epoxidation reactor effluent to said ethylene oxide absorber used for separating said second epoxidation reactor effluent into a third

recycle stream, having a fifth carbon dioxide concentration, and a second ethylene oxide stream;

dividing said third recycle stream into a second split portion, if any, and a second remaining portion;

charging at least a portion of said second remaining portion to said carbon dioxide removal system as said carbon dioxide-containing feed gas to yield as said carbon dioxide depleted gas stream a fourth recycle stream, having a sixth carbon dioxide concentration, and to yield as said carbon dioxide gas stream a second carbon dioxide vent stream; and

combining at least a portion of said second split portion, if any, and at least a portion of said fourth recycle stream with oxygen and ethylene to thereby form said second reactor feed.

2. (Original) A method as recited in claim 1, wherein said lean solvent comprises an aqueous solution of alkali metal carbonate.

3. (Original) A method as recited in claim 2, further comprising adding an activator to said aqueous solution of alkali metal carbonate.

4. (Original) A method as recited in claim 3, further comprising: providing a second carbon dioxide absorber operatively connected in parallel with said carbon dioxide absorber wherein said second carbon dioxide absorber is capable of receiving at least a portion of said second remaining portion and contacting therewith said lean solvent to thereby provide at least a portion of said fourth recycle stream.

5. (Original) A method as recited in claim 3, further comprising: modifying the internals of said carbon dioxide absorber to thereby provide enhanced mass transfer and a greater number of theoretical trays and to improve the recovery of carbon dioxide from said at least a portion of said second split portion.

6. (Original) A method as recited in claim 3, further comprising: operating said carbon dioxide absorber so as to provide a fourth carbon dioxide concentration less than said first carbon dioxide concentration.

7. (Original) A method as recited in claim 1, wherein the fourth carbon dioxide concentration is less than 3 mole percent, based on the total moles of ethylene, oxygen and carbon dioxide in the reactor feed.

8. (Original) A method as recited in claim 7, wherein the fourth carbon dioxide concentration is in the range of from 0.1 to less than 2 mole percent, based on the total moles of ethylene, oxygen and carbon dioxide in the reactor feed.

9. (Original) A method as recited in claim 8, wherein the fourth carbon dioxide concentration is in the range of from 0.2 to less than 1.5 mole percent, based on the total moles of ethylene, oxygen and carbon dioxide in the reactor feed.

10. (Original) A method as recited in claim 1, wherein the high selectivity epoxidation catalyst is a silver-based catalyst which includes a rhenium promoter component, and the high activity catalyst is a silver-based catalyst that does not contain a rhenium promoter component, or contains a nonpromoting amount of a rhenium component.

11. (Previously Presented) A method as recited in claim 10, wherein the high selectivity epoxidation catalyst comprises as a support material an alpha alumina, the amount of silver is in the range of from 1 to 40 weight percent, and the amount of rhenium is in the range of from 0.1 to 10 micromoles per gram, based on the total weight of catalyst; and wherein the high activity catalyst comprises as a support material an alpha alumina, and the amount of silver is in the range of from 1 to 40 weight percent, based on the total weight of catalyst.

12. (Original) A method as recited in claims 1, wherein said first reactor feed comprises ethylene and oxygen, in addition to a concentration of carbon dioxide, and said second reactor feed comprises ethylene and oxygen, in addition to a concentration of carbon dioxide.

13. (Original) A process for manufacturing ethylene oxide, comprising manufacturing ethylene oxide by operating an ethylene oxide manufacturing process which has been improved by a method as recited in claim 1.

14. (Previously Presented) A method of improving the operation of an existing ethylene oxide manufacturing process, said method comprises:

charging a first reactor feed, having a first carbon dioxide concentration, to an epoxidation reactor system comprising an epoxidation reactor containing a first volume of a silver-based catalyst that does not contain a rhenium promoter component, or contains a nonpromoting amount of a rhenium component;

yielding from said epoxidation reactor system a first epoxidation reactor effluent;

charging at least a portion of said first epoxidation reactor effluent to an ethylene oxide absorber used for separating said first epoxidation reactor effluent into a first recycle stream, having a second carbon dioxide concentration, and a first ethylene oxide stream;

dividing said first recycle stream into a first split portion and a first remaining portion;

providing a carbon dioxide removal system which includes a carbon dioxide absorber and a solvent regenerator, wherein said carbon dioxide absorber provides for receiving a carbon dioxide-containing feed gas and for contacting said carbon dioxide-containing feed gas with a lean solvent to yield a rich solvent and a carbon dioxide depleted gas stream, and wherein said solvent regenerator provides for receiving said rich solvent and separating carbon dioxide there from and yielding said lean solvent and a carbon dioxide gas stream;

charging at least a portion of said first remaining portion to said carbon dioxide removal system as said carbon dioxide-containing feed gas to yield as said carbon dioxide depleted gas stream a second recycle stream, having a third carbon dioxide concentration, and to yield as said carbon dioxide gas stream a first carbon dioxide vent stream;

combining at least a portion of said first split portion and at least a portion of said second recycle stream with oxygen and ethylene to thereby form said first reactor feed;

removing from said epoxidation reactor at least a portion of said first volume of said silver-based catalyst that does not contain a rhenium promoter component, or contains a nonpromoting amount of a rhenium component, and replacing therewith a replacement charge of a second volume of a silver-based catalyst which includes a rhenium promoter component, to provide a modified epoxidation reactor system;

charging a second reactor feed, having a fourth carbon dioxide concentration which is lower than said first carbon dioxide concentration, to said modified epoxidation reactor system having said replacement charge;

yielding from said modified epoxidation reactor system a second epoxidation reactor effluent;

charging at least a portion of said second epoxidation reactor effluent to said ethylene oxide absorber used for separating said second epoxidation reactor effluent into a third

recycle stream, having a fifth carbon dioxide concentration, and a second ethylene oxide stream;

dividing said third recycle stream into a second split portion, if any, and a second remaining portion;

charging at least a portion of said second remaining portion to said carbon dioxide removal system as said carbon dioxide-containing feed gas to yield as said carbon dioxide depleted gas stream a fourth recycle stream, having a sixth carbon dioxide concentration, and to yield as said carbon dioxide gas stream a second carbon dioxide vent stream; and

combining at least a portion of said second split portion, if any, and at least a portion of said fourth recycle stream with oxygen and ethylene to thereby form said second reactor feed.

15. (Previously Presented) A method as recited in claim 14, wherein said lean solvent comprises an aqueous solution of alkali metal carbonate.

16. (Previously Presented) A method as recited in claim 15, further comprising adding an activator to said aqueous solution of alkali metal carbonate.

17. (Previously Presented) A method as recited in claim 16, further comprising: providing a second carbon dioxide absorber operatively connected in parallel with said carbon dioxide absorber wherein said second carbon dioxide absorber is capable of receiving at least a portion of said second remaining portion and contacting therewith said lean solvent to thereby provide at least a portion of said fourth recycle stream.

18. (Previously Presented) A method as recited in claim 16, further comprising: modifying the internals of said carbon dioxide absorber to thereby provide enhanced mass transfer and a greater number of theoretical trays and to improve the recovery of carbon dioxide from said at least a portion of said second split portion.

19. (Previously Presented) A method as recited in claim 16, further comprising: operating said carbon dioxide absorber so as to provide a fourth carbon dioxide concentration less than said first carbon dioxide concentration.

20. (Previously Presented) A method as recited in claim 14, wherein the fourth carbon dioxide concentration is less than 3 mole percent, based on the total moles of ethylene, oxygen and carbon dioxide in the reactor feed.

21. (Previously Presented) A method as recited in claim 20, wherein the fourth carbon dioxide concentration is in the range of from 0.1 to less than 2 mole percent, based on the total moles of ethylene, oxygen and carbon dioxide in the reactor feed.

22. (Previously Presented) A method as recited in claim 21, wherein the fourth carbon dioxide concentration is in the range of from 0.2 to less than 1.5 mole percent, based on the total moles of ethylene, oxygen and carbon dioxide in the reactor feed.

23. (Previously Presented) A method as recited in claim 14, wherein the silver-based catalyst which includes a rhenium promoter component comprises as a support material an alpha alumina, the amount of silver is in the range of from 1 to 40 weight percent, and the amount of rhenium is in the range of from 0.1 to 10 micromoles per gram, based on the total weight of catalyst; and wherein the silver-based catalyst that does not contain a rhenium promoter component, or contains a nonpromoting amount of a rhenium component, comprises as a support material an alpha alumina, and the amount of silver is in the range of from 1 to 40 weight percent, based on the total weight of catalyst.

24. (Previously Presented) A method as recited in claims 14, wherein said first reactor feed comprises ethylene and oxygen, in addition to a concentration of carbon dioxide, and said second reactor feed comprises ethylene and oxygen, in addition to a concentration of carbon dioxide.

25. (Previously Presented) A process for manufacturing ethylene oxide, comprising manufacturing ethylene oxide by operating an ethylene oxide manufacturing process which has been improved by a method as recited in claim 14.

26. (Previously Presented) A method of improving the operation of an existing ethylene oxide manufacturing process, said method comprises:

charging a first reactor feed, comprising ethylene and oxygen and having a first carbon dioxide concentration, to an epoxidation reactor system comprising an epoxidation reactor containing a first volume of high activity epoxidation catalyst;

yielding from said epoxidation reactor system a first epoxidation reactor effluent;

removing from said epoxidation reactor at least a portion of said first volume of high activity epoxidation catalyst and replacing therewith a replacement charge of a second volume of a high selectivity epoxidation catalyst to provide a modified epoxidation reactor system;

charging a second reactor feed, comprising ethylene and oxygen and having a fourth carbon dioxide concentration which is lower than said first carbon dioxide concentration, to said modified epoxidation reactor system having said replacement charge; and

yielding from said modified epoxidation reactor system a second epoxidation reactor effluent.

27. (Previously Presented) A method as recited in claim 26, wherein the fourth carbon dioxide concentration is less than 3 mole percent, based on the total moles of ethylene, oxygen and carbon dioxide in the reactor feed.

28. (Previously Presented) A method as recited in claim 27, wherein the fourth carbon dioxide concentration is in the range of from 0.1 to less than 2 mole percent, based on the total moles of ethylene, oxygen and carbon dioxide in the reactor feed.

29. (Previously Presented) A method as recited in claim 28, wherein the fourth carbon dioxide concentration is in the range of from 0.2 to less than 1.5 mole percent, based on the total moles of ethylene, oxygen and carbon dioxide in the reactor feed.

30. (Previously Presented) A method as recited in claim 26, wherein the high selectivity epoxidation catalyst is a silver-based catalyst which includes a rhenium promoter component, and the high activity catalyst is a silver-based catalyst that does not contain a rhenium promoter component, or contains a nonpromoting amount of a rhenium component.

31. (Previously Presented) A method as recited in claim 30, wherein the high selectivity epoxidation catalyst comprises as a support material an alpha alumina, the amount of silver is in the range of from 1 to 40 weight percent, and the amount of rhenium is in the range of

from 0.1 to 10 micromoles per gram, based on the total weight of catalyst; and wherein the high activity catalyst comprises as a support material an alpha alumina, and the amount of silver is in the range of from 1 to 40 weight percent, based on the total weight of catalyst.

32. (Previously Presented) A process for manufacturing ethylene oxide, comprising manufacturing ethylene oxide by operating an ethylene oxide manufacturing process which has been improved by a method as recited in claim 26.

33. (Previously Presented) A method of improving the operation of an existing ethylene oxide manufacturing process, said method comprises:

charging a first reactor feed, comprising ethylene and oxygen and having a first carbon dioxide concentration, to an epoxidation reactor system comprising an epoxidation reactor containing a first volume of a silver-based catalyst that does not contain a rhenium promoter component, or contains a nonpromoting amount of a rhenium component;

yielding from said epoxidation reactor system a first epoxidation reactor effluent;

removing from said epoxidation reactor at least a portion of said first volume of said silver-based catalyst that does not contain a rhenium promoter component, or contains a nonpromoting amount of a rhenium component, and replacing therewith a replacement charge of a second volume of a silver-based catalyst which includes a rhenium promoter component, to provide a modified epoxidation reactor system;

charging a second reactor feed, comprising ethylene and oxygen and having a fourth carbon dioxide concentration which is lower than said first carbon dioxide concentration, to said modified epoxidation reactor system having said replacement charge; and

yielding from said modified epoxidation reactor system a second epoxidation reactor effluent.

34. (Previously Presented) A method as recited in claim 33, wherein the fourth carbon dioxide concentration is less than 3 mole percent, based on the total moles of ethylene, oxygen and carbon dioxide in the reactor feed.

35. (Previously Presented) A method as recited in claim 34, wherein the fourth carbon dioxide concentration is in the range of from 0.1 to less than 2 mole percent, based on the total moles of ethylene, oxygen and carbon dioxide in the reactor feed.

36. (Previously Presented) A method as recited in claim 35, wherein the fourth carbon dioxide concentration is in the range of from 0.2 to less than 1.5 mole percent, based on the total moles of ethylene, oxygen and carbon dioxide in the reactor feed.

37. (Previously Presented) A method as recited in claim 33, wherein the high selectivity epoxidation catalyst comprises as a support material an alpha alumina, the amount of silver is in the range of from 1 to 40 weight percent, and the amount of rhenium is in the range of from 0.1 to 10 micromoles per gram, based on the total weight of catalyst; and wherein the high activity catalyst comprises as a support material an alpha alumina, and the amount of silver is in the range of from 1 to 40 weight percent, based on the total weight of catalyst.

38. (Previously Presented) A process for manufacturing ethylene oxide, comprising manufacturing ethylene oxide by operating an ethylene oxide manufacturing process which has been improved by a method as recited in claim 33.